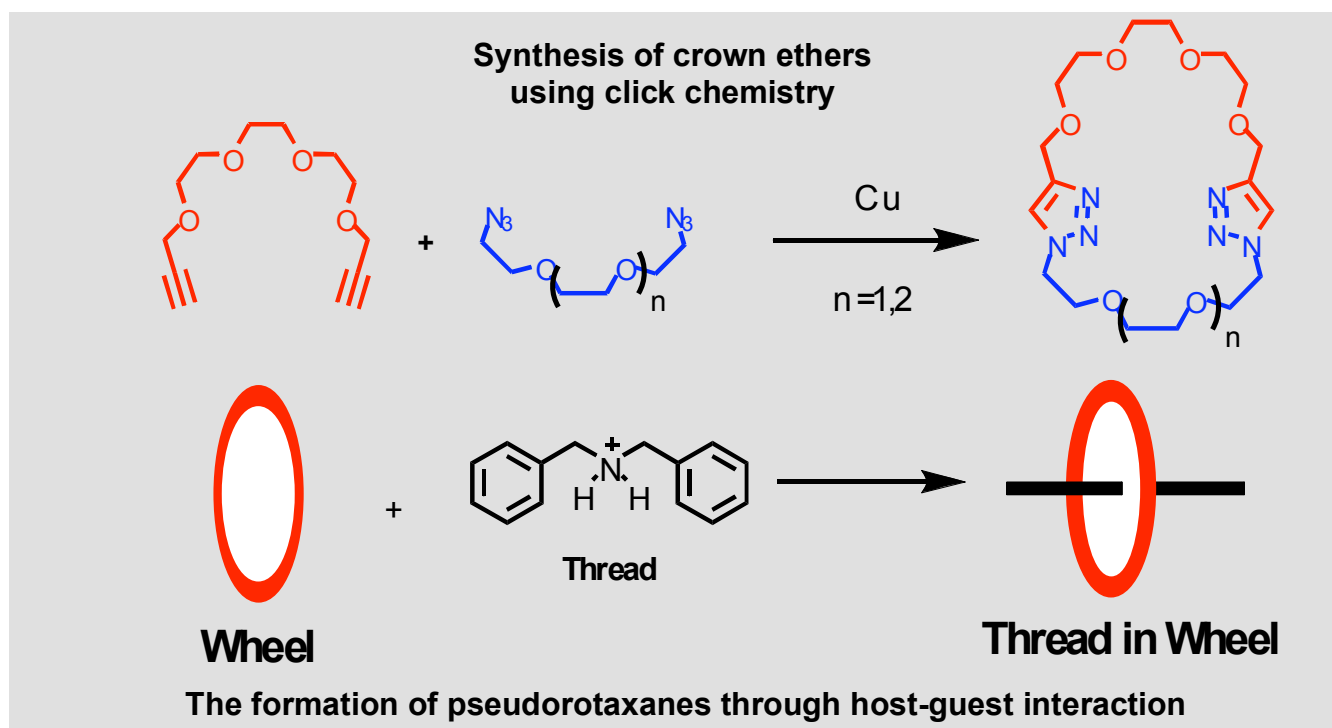




Synthetic Hosts for Molecular Machinery Using Click Chemistry

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Macrocyclic crown ethers represent a unique family in the supramolecular chemistry for their ability to recognize various types of guests. Supramolecular aggregates and arrays based on crown ethers, such as pseudorotaxanes and rotaxanes, can be obtained relying on non-covalent bonding interactions. However, the nature of the complexation between the macrocyclic host and guests is very sensitive to the size and composition of the crown ether.

We have developed the efficient synthesis of macrocyclic crown ether-like structures in order to study the effect of structural variation on their interactions with guests. We have successfully designed a general method for obtaining crown ether-like macrocycles using the reliable “click chemistry”, and then quantified their ability of guest binding using, in particular, dibenzylammonium hexafluorophosphate (DBA⁺.PF₆⁻). The method represents a modular approach to macrocyclization that can be easily extended to the development of a vast array of hosts with desirable functionality. The pseudorotaxanes from the macrocycles and the guest component are important precursors to mechanically interlocked molecules such as rotaxanes and catenanes, which are active molecular machines at the nanoscale.